IDENTIFYING CUSTOMER INTEREST FROM SURVEILLANCE CAMERA BASED ON DEEP LEARNING

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INTRODUCTION

Identifying customer’s interests is valuable as it intuitively represents the product the customer wants. It can also be an effective marketing strategy for determining potential customers. Therefore, large retail vendors like Walmart and Costco analyze customer purchase history to identify customer interest. However, purchase history alone cannot fully determine how much interest in the product a customer has other than what they have purchased. In other words, products that the customer does not purchase but are interested can never be identified. This project focuses on identifying a customer’s interest based on behaviors from surveillance cameras. We detect the customer's gaze direction as this behavior accurately reflects customer interest in a particular product

MODULES

Module 1: Admin:

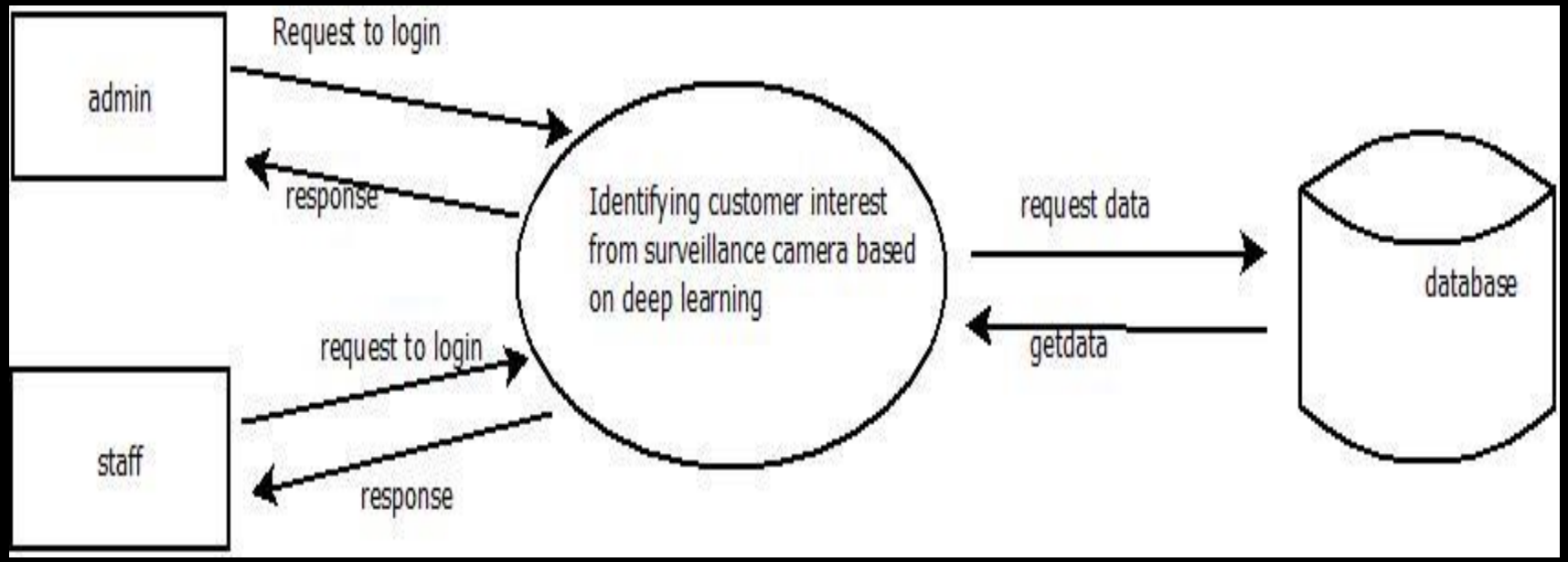
- Add and manage Staffs
- Add and manage camera
- Send Notification to Staff
- View Notification
- Assign work to staff
- View work status

Module 2: Staff:

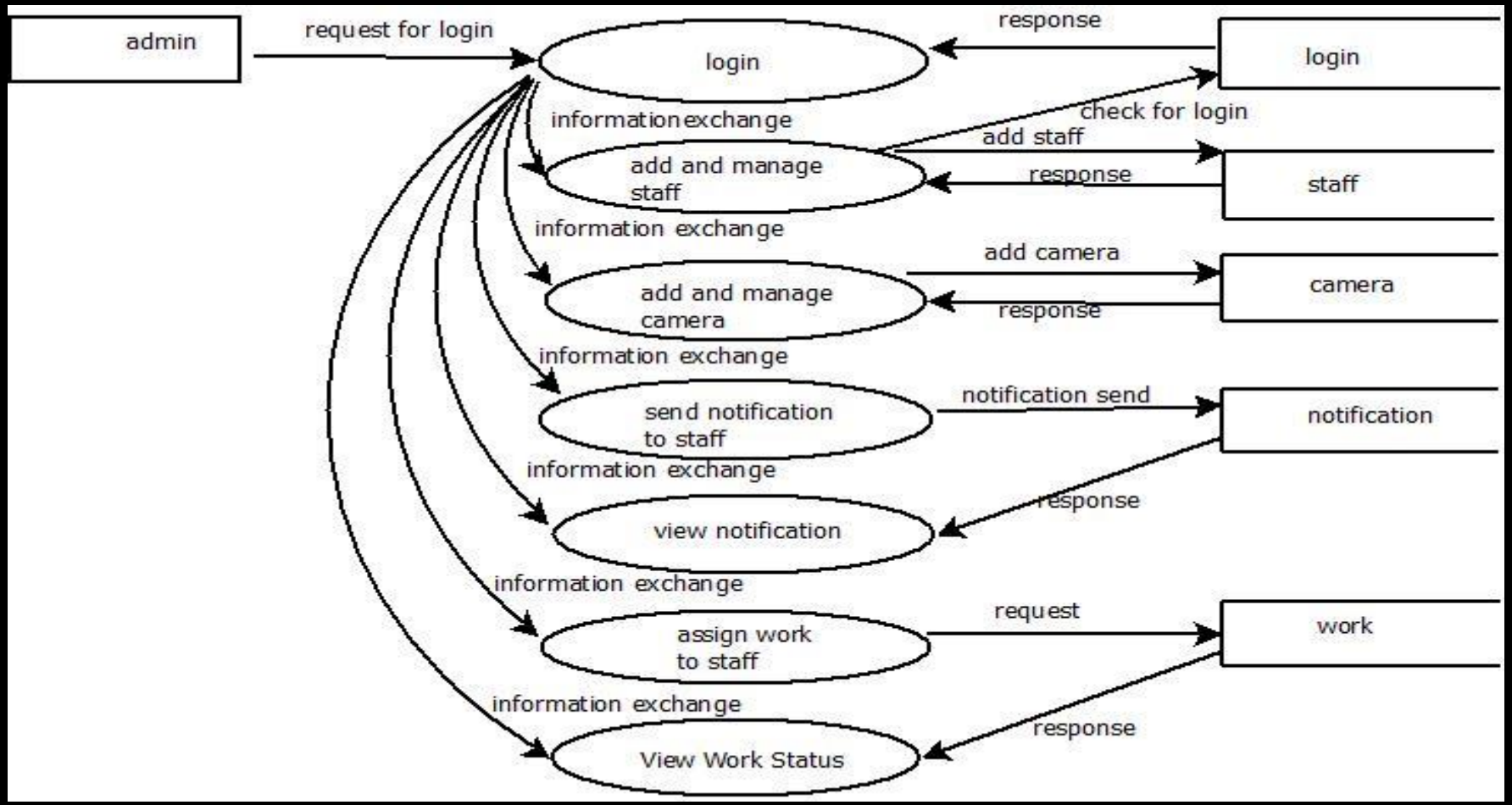
- Login
- View works and update status
- View notification from admin
- View notification from camera

DATA FLOW DIAGRAM

LEVEL 0



LEVEL 1.1


admin
request for login
login
response
login
information exchange
check for login
add staff
add and manage staff
response
staff
information exchange
add camera
add and manage camera
response
camera
information exchange
send notification to staff
notification send
notification
information exchange
response
view notification
information exchange
request
assign work to staff
work
information exchange
response
View Work Status

LEVEL 1.2

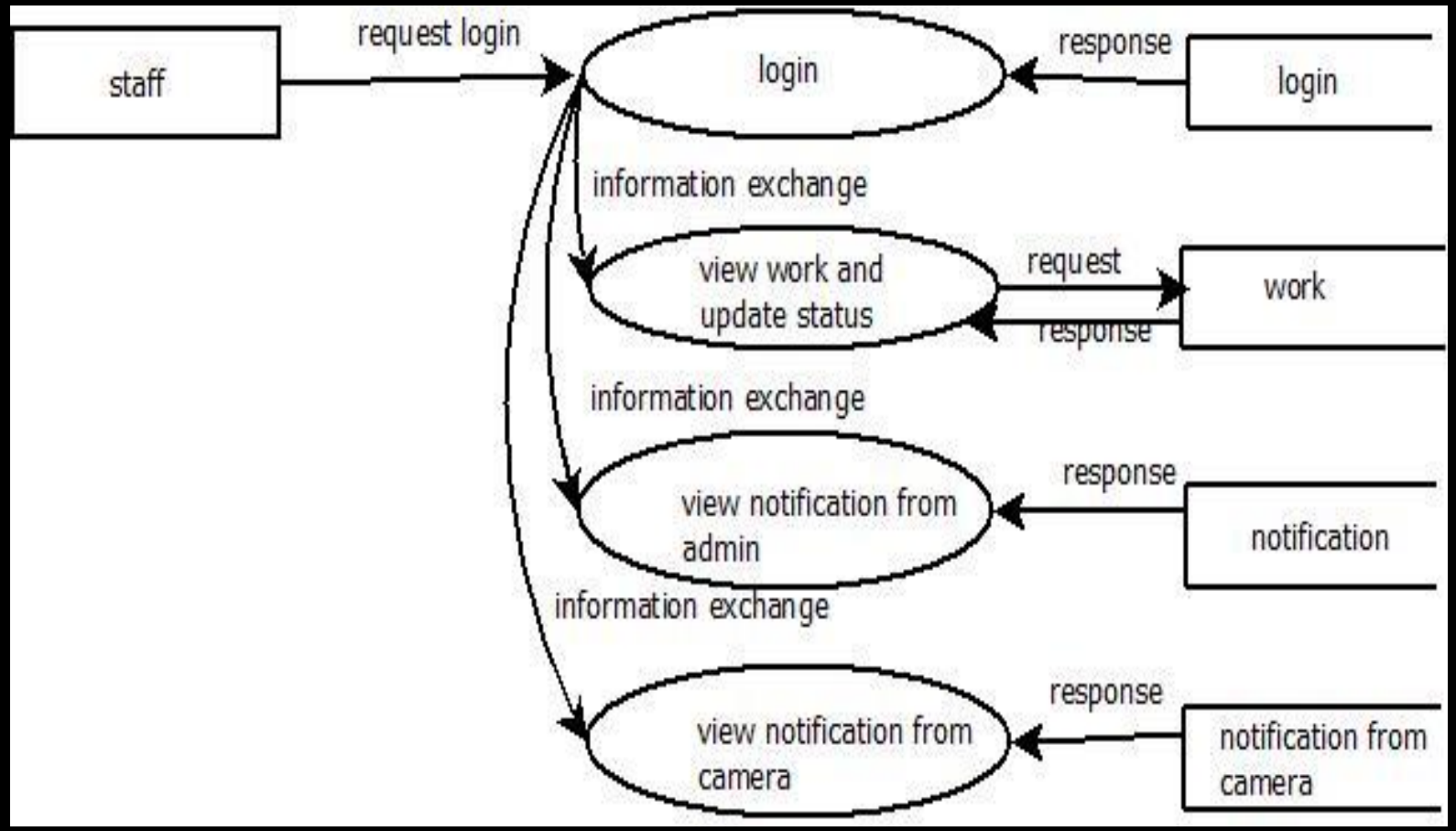
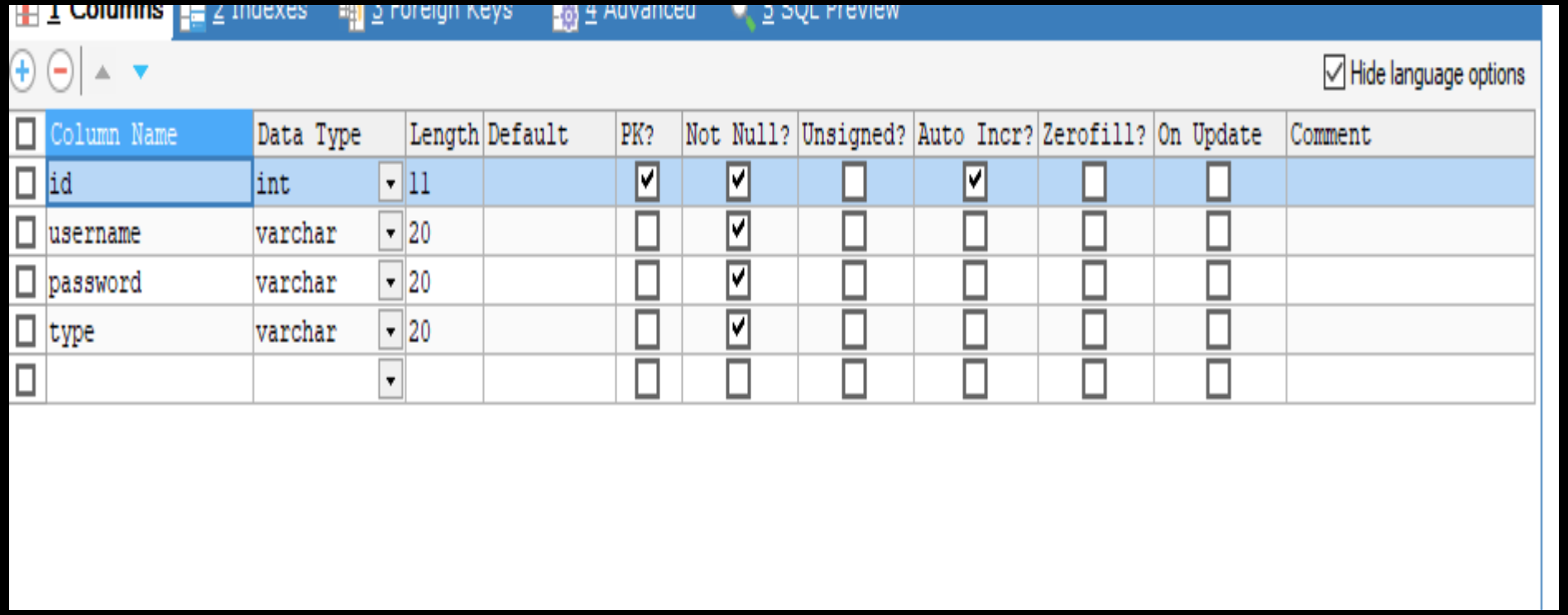
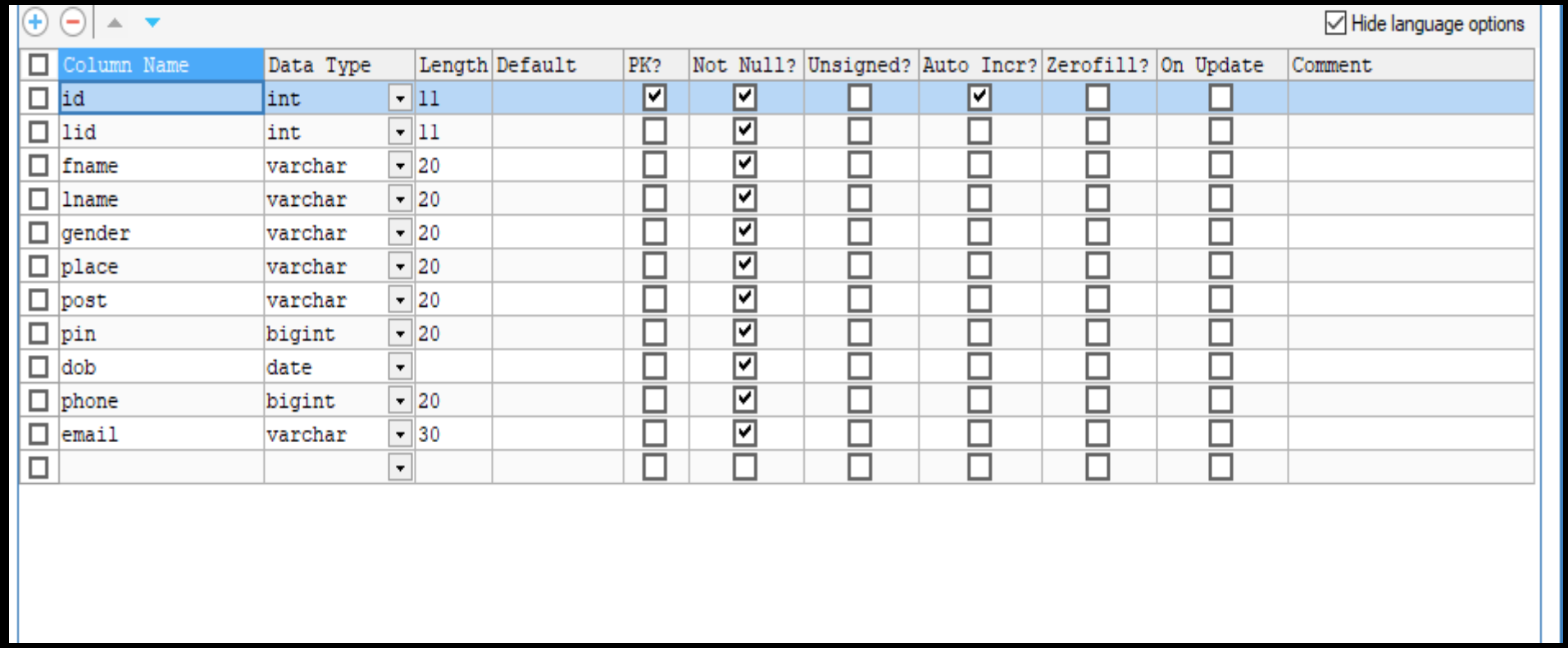

staff
request login
login
response
login
information exchange
view work and update status
request
work
response
information exchange
view notification from admin
response
notification
information exchange
view notification from camera
response
notification from camera

TABLE DESIGN

Login



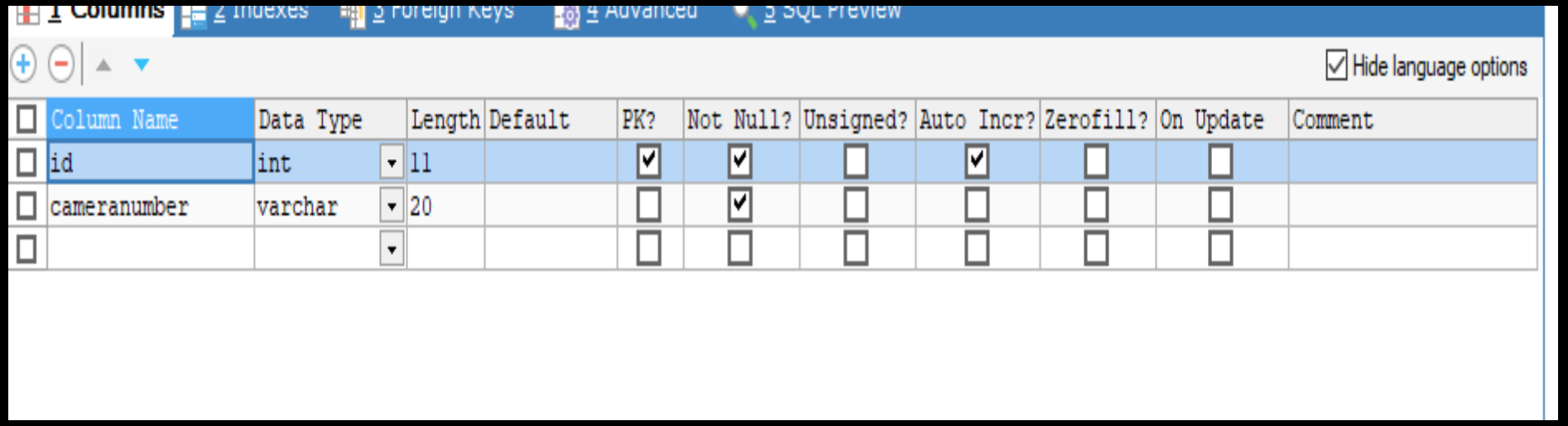
Staff



Hide language options

Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
id	int	11		☑	☑	☐	☑	☐	☐	
lid	int	11		☐	☑	☐	☐	☐	☐	
fname	varchar	20		☐	☑	☐	☐	☐	☐	
lname	varchar	20		☐	☑	☐	☐	☐	☐	
gender	varchar	20		☐	☑	☐	☐	☐	☐	
place	varchar	20		☐	☑	☐	☐	☐	☐	
post	varchar	20		☐	☑	☐	☐	☐	☐	
pin	bigint	20		☐	☑	☐	☐	☐	☐	
dob	date			☐	☑	☐	☐	☐	☐	
phone	bigint	20		☐	☑	☐	☐	☐	☐	
email	varchar	30		☐	☑	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

Camera



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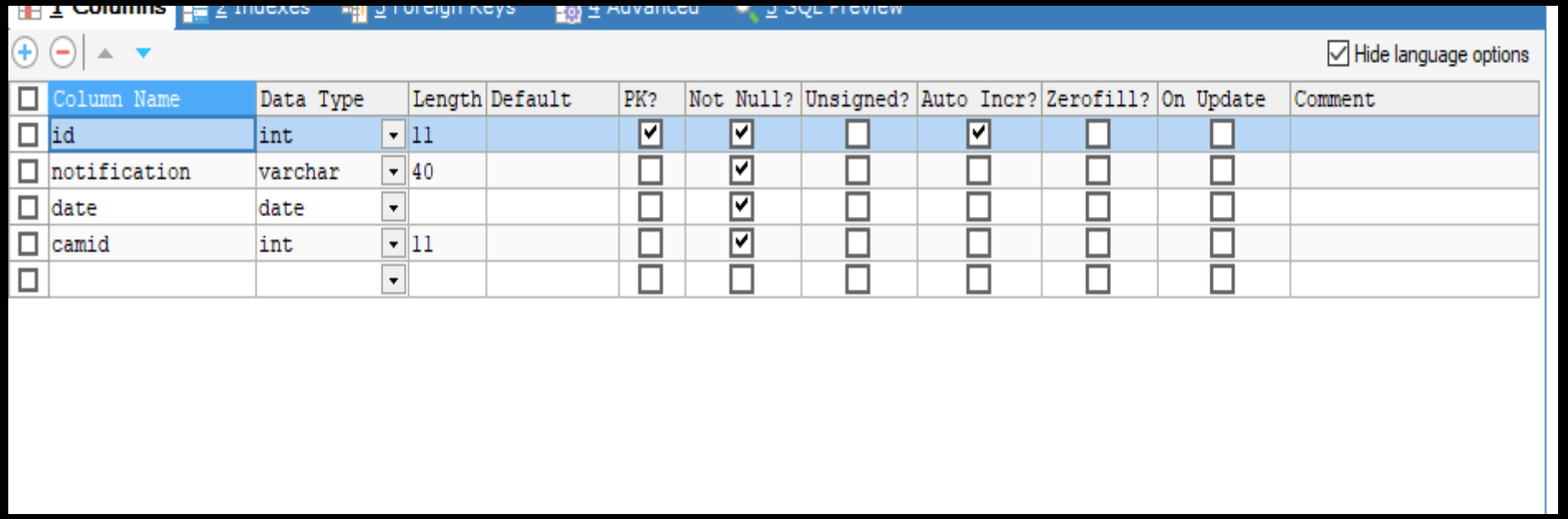
cameranumber	varchar	20		☐	☑	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

Notification



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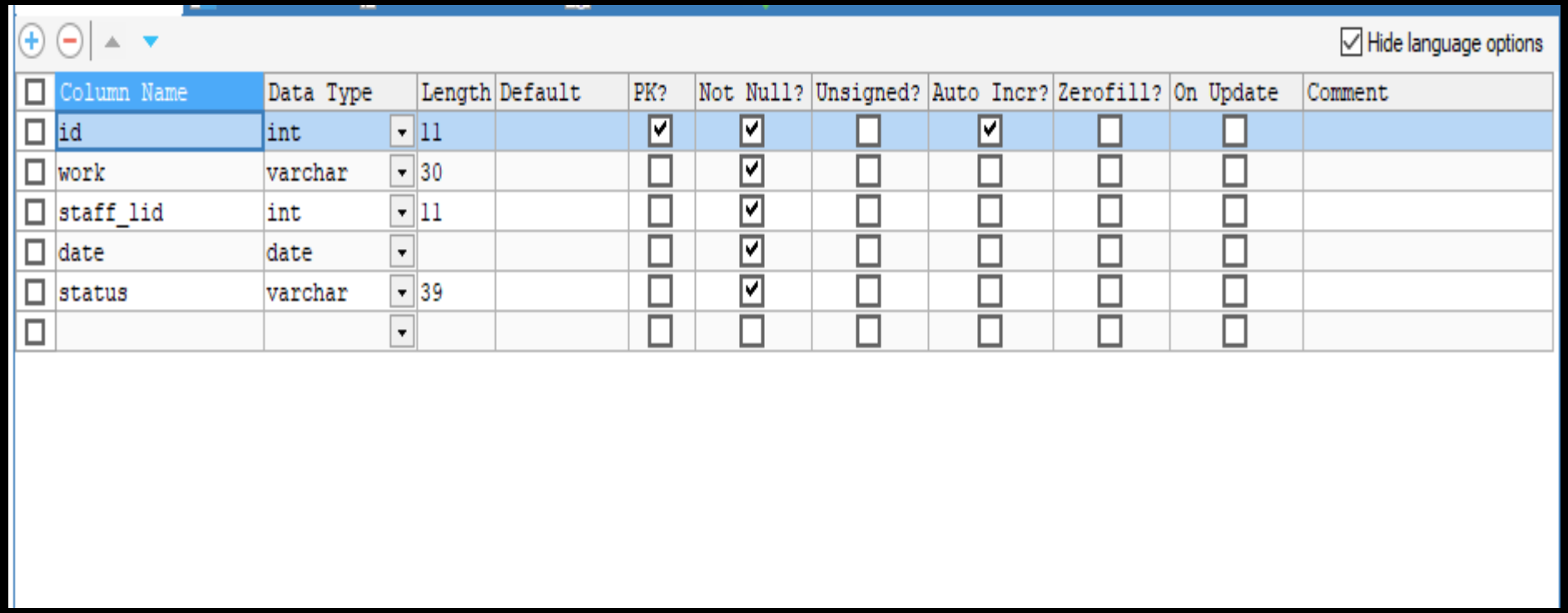
notification	varchar	40		☐	☑	☐	☐	☐	☐	
date	date			☐	☑	☐	☐	☐	☐	
camid	int	11		☐	☑	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

Work



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Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
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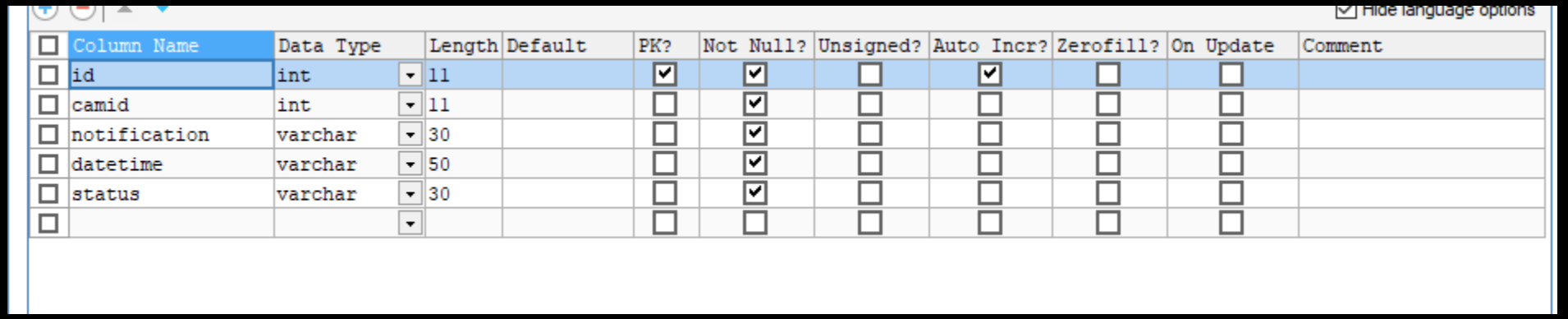
work	varchar	30		☐	☑	☐	☐	☐	☐	
staff_lid	int	11		☐	☑	☐	☐	☐	☐	
date	date			☐	☑	☐	☐	☐	☐	
status	varchar	39		☐	☑	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

camnotification



Hide language options

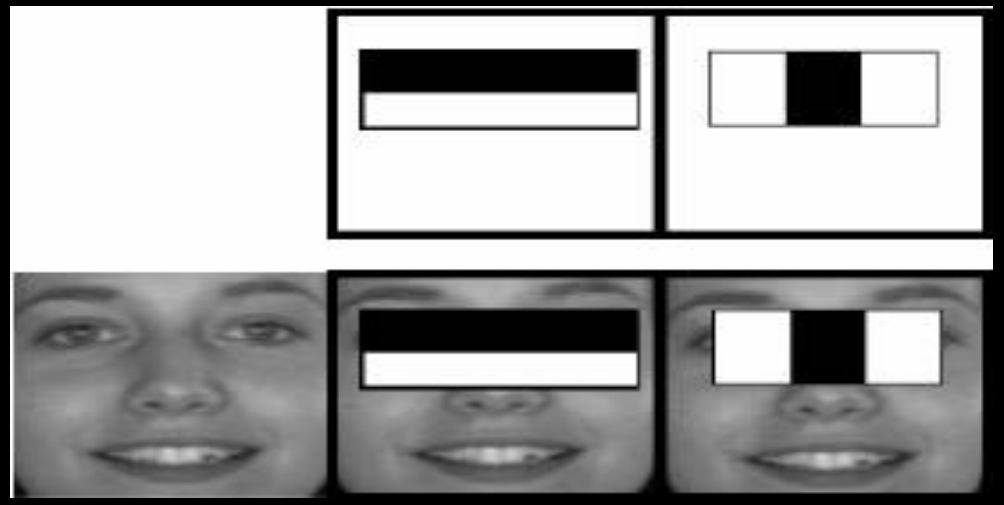
Column Name	Data Type	Length	Default	PK?	Not Null?	Unsigned?	Auto Incr?	Zerofill?	On Update	Comment
id	int	11		☑	☑	☐	☑	☐	☐	
camid	int	11		☐	☑	☐	☐	☐	☐	
notification	varchar	30		☐	☑	☐	☐	☐	☐	
datetime	varchar	50		☐	☑	☐	☐	☐	☐	
status	varchar	30		☐	☑	☐	☐	☐	☐	
				☐	☐	☐	☐	☐	☐	

METHODOLOGY

Developing Environments

- Languages used: Python
- Front End : HTML, CSS, JAVASCRIPT
- Backend : MySQL
- Data set : Facial emotion recognition (FER) data set from Kaggle website is used
- OS : Windows 7 or Above, Android
- Platform used : JetBrains, PyCharm, Android Studio
- Frame work : Flask
- Technology :Python, Java
- Algorithm : Haar Cascade Algorithm, CNN algorithm

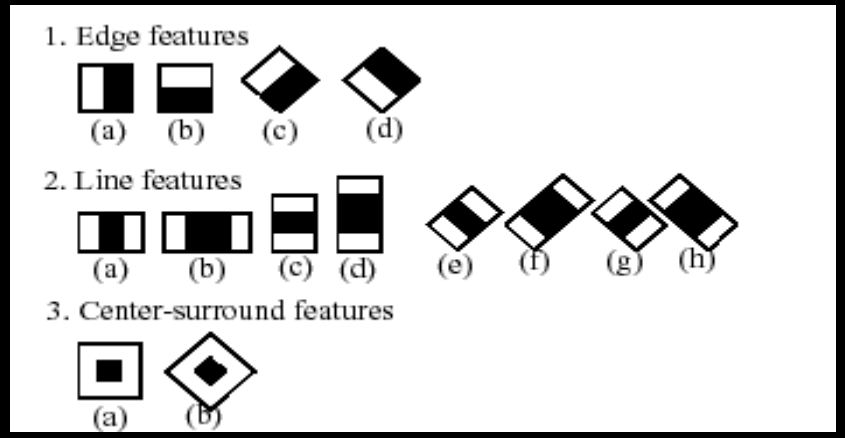
HAAR CASCADE ALGORITHM



The Viola-Jones object detection framework is a machine learning approach for object detection, proposed by Paul Viola and Micheal Jones in 2001. This framework can be trained to detect almost any object, but this primarily solves the problem of face detection in real-time. This algorithm has four steps.

1. Haar Feature Selection

Objects are classified on very simple features as a feature to encode ad-hoc domain knowledge and operate much faster than pixel system. The feature is similar to haar filters, hence the name ‘Haar’. An example of these features is a 2-rectangle feature, defined as the difference of the sum of pixels of area inside the rectangle, which can be any position and scale within the original image. 3-rectangle and 4-rectangle features are also used here.



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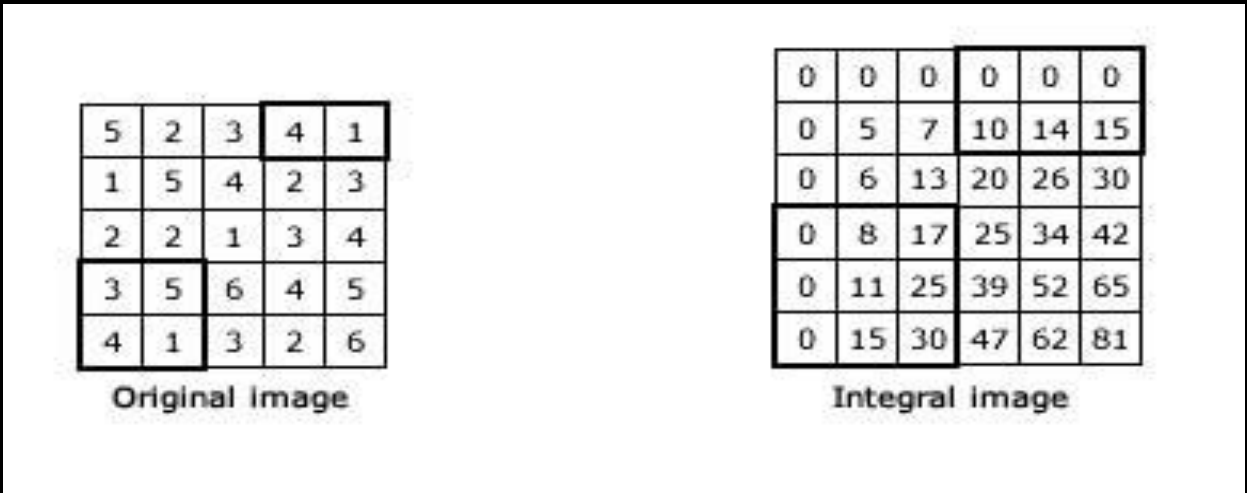
2.Integral Image Representation

The Value of any point in an Integral Image, is the sum of all the pixels above and left of that point. An Integral Image can be calculated efficiently in one pass over the image.



5	2	3	4	1
1	5	4	2	3
2	2	1	3	4
3	5	6	4	5
4	1	3	2	6

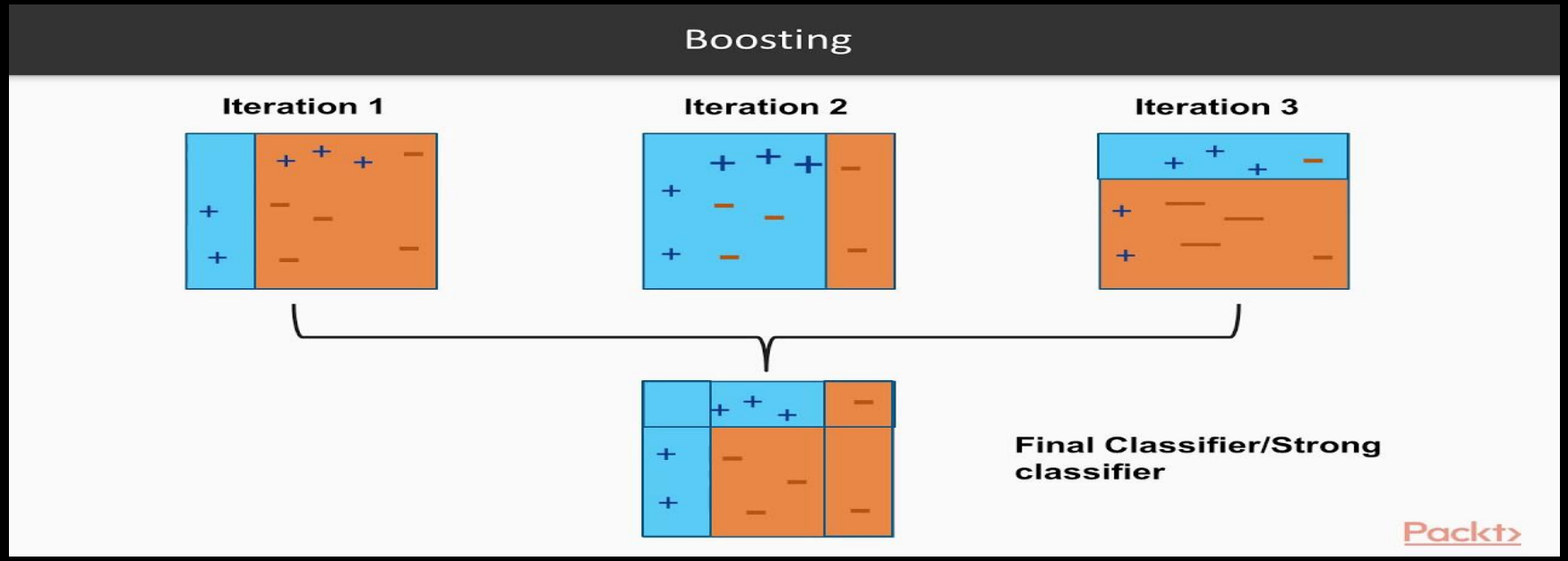
Original image

0	0	0	0	0	0
0	5	7	10	14	15
0	6	13	20	26	30
0	8	17	25	34	42
0	11	25	39	52	65
0	15	30	47	62	81

Integral image

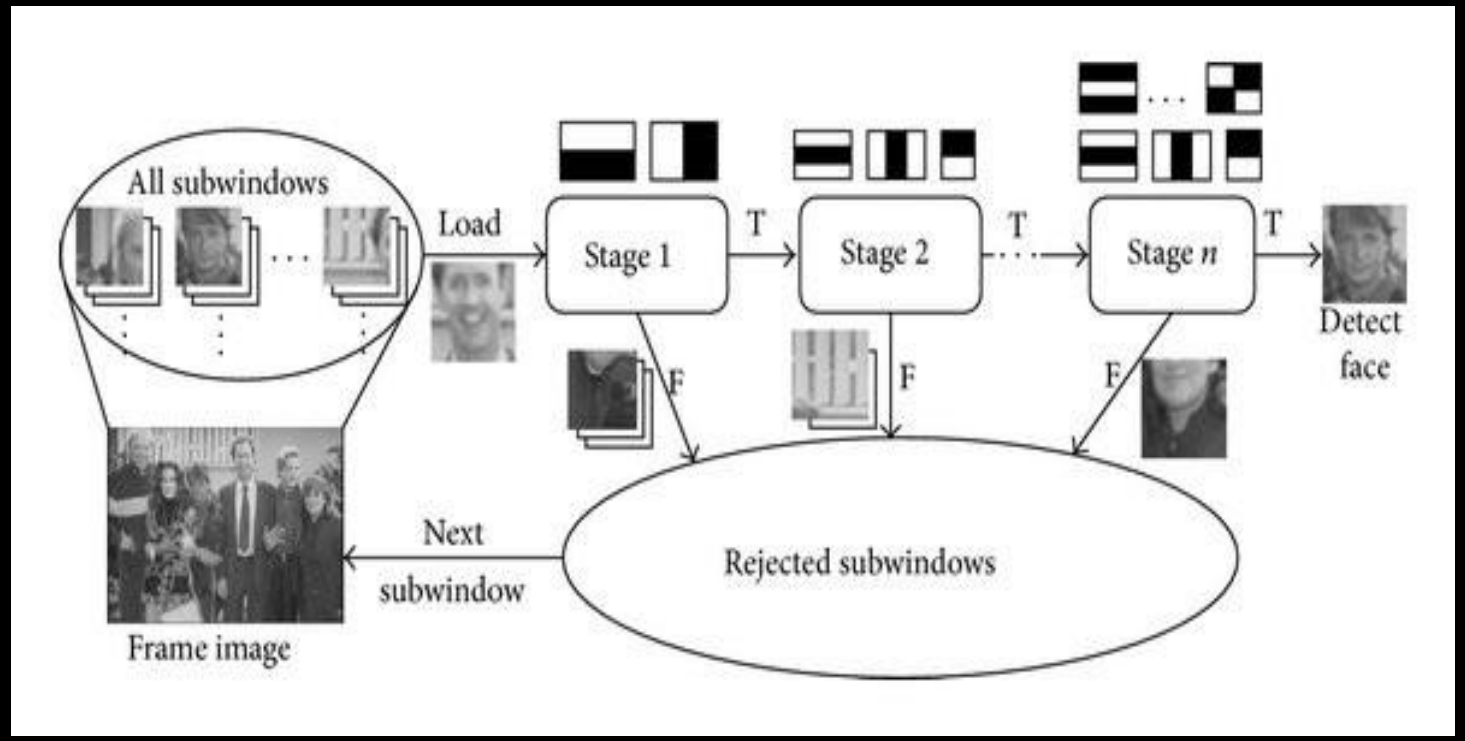
3.Adaboost Training

For a window of 24x24 pixels, there can be about 162,336 possible features that would be very expensive to evaluate. Hence AdaBoost algorithm is used to train the classifier with only the best features.



4.Cascade Classifier Architecture

A cascade classifier refers to the concatenation of several classifiers arranged in successive order. It makes large numbers of small decisions as to whether its the object or not. The structure of the cascade classifier is of a degenerate decision tree



FUTURE ENHANCEMENT

In this project focused on identify a customer’s interest in the product.so it is very helpful to identify the customer interest for a particular product and you can bring more of that product to the shop.

USER STORIES

User Story ID	As a type of user	I want to <Perform Some Task>	So that I can <Achieve Some Goal>
1	Admin	login	login successful with correct username and password
2	Admin	Add and manage staff	Add ,view,edit,delete the staffs
3	Admin	Add and manage camera	Add ,edit ,delete the camera number
4	Admin	Send notification to staff	Send notification to the staff
5	Admin	View notification	View the notification from camera
6	Admin	Assign work to staff	Assigned work to individual staff
7	Admin	View work status	View the work status
8	staff	login	login successful with correct username and password
9	Staff	View work and update	View the work details and update
10	Staff	View notification from admin	View the notification from admin
11	Staff	View notification from camera	Camera notification is viewed

PRODUCT BACKLOG

User Story ID	Priority <High/Medium/Low>	Size (Hours)	Sprint <#>	Status <Planned/In progress/Completed>	Release Date	Release Goal
1	Medium	2	1	Completed	8-1-2022	Table design
2	High	3		Completed	8-1-2022	Form design
3	High	5		Completed	8-1-2022	Basic coding
4	High	5	2	Completed	22-1-2022	Data set creation
5	Medium	5		Completed	22-1-2022	Detection of face
6	High	5	3	Completed	5-02-2022	customer's gaze direction method
7	Medium	5		Completed	17-2-2022	identify customer interest
8	Medium	5	4	Completed	20-2-2022	Testing data
9	High	5		Completed	20-2-2022	Output generation

PROJECT PLAN

User Story ID	Task Name	Start Date	End Date	Days	Status
1	Sprint 1	26/12/2021	28/12/2021	2	completed
2		29/12/2021	31/12/2021	3	completed
3		03/12/2021	08/01/2022	5	completed
4	Sprint 2	09/01/2022	16/01/2022	8	Planned
5		18/01/2022	22/01/2022	5	Planned
6	Sprint 3	23/01/2022	27/01/2022	5	Planned
7		30/01/2022	05/02/2022	7	Planned
8	Sprint 4	06/02/2022	10/02/2022	5	Planned
9		16/02/2022	20/02/2022	4	Planned

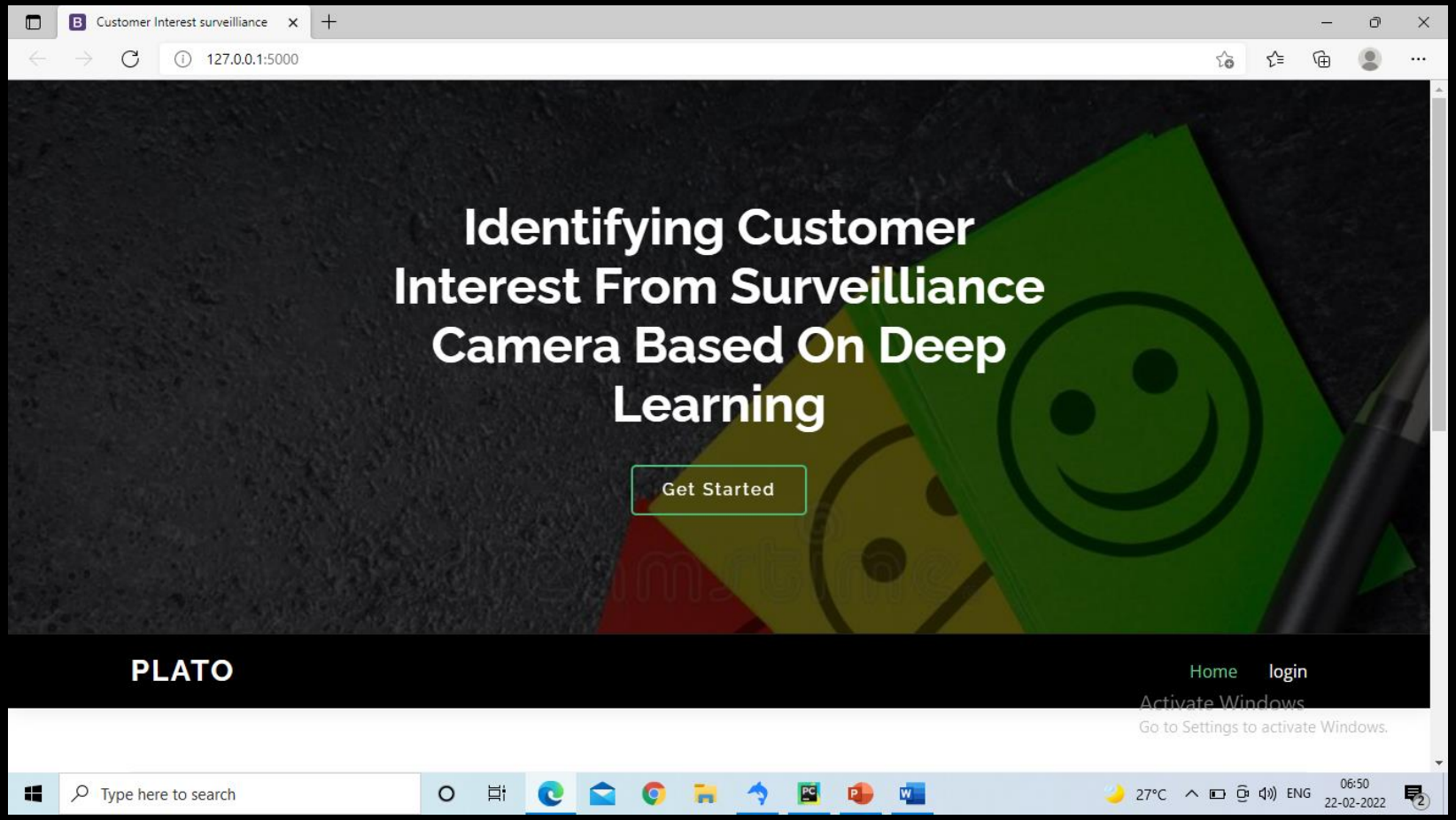
SPRINT BACKLOG PLAN

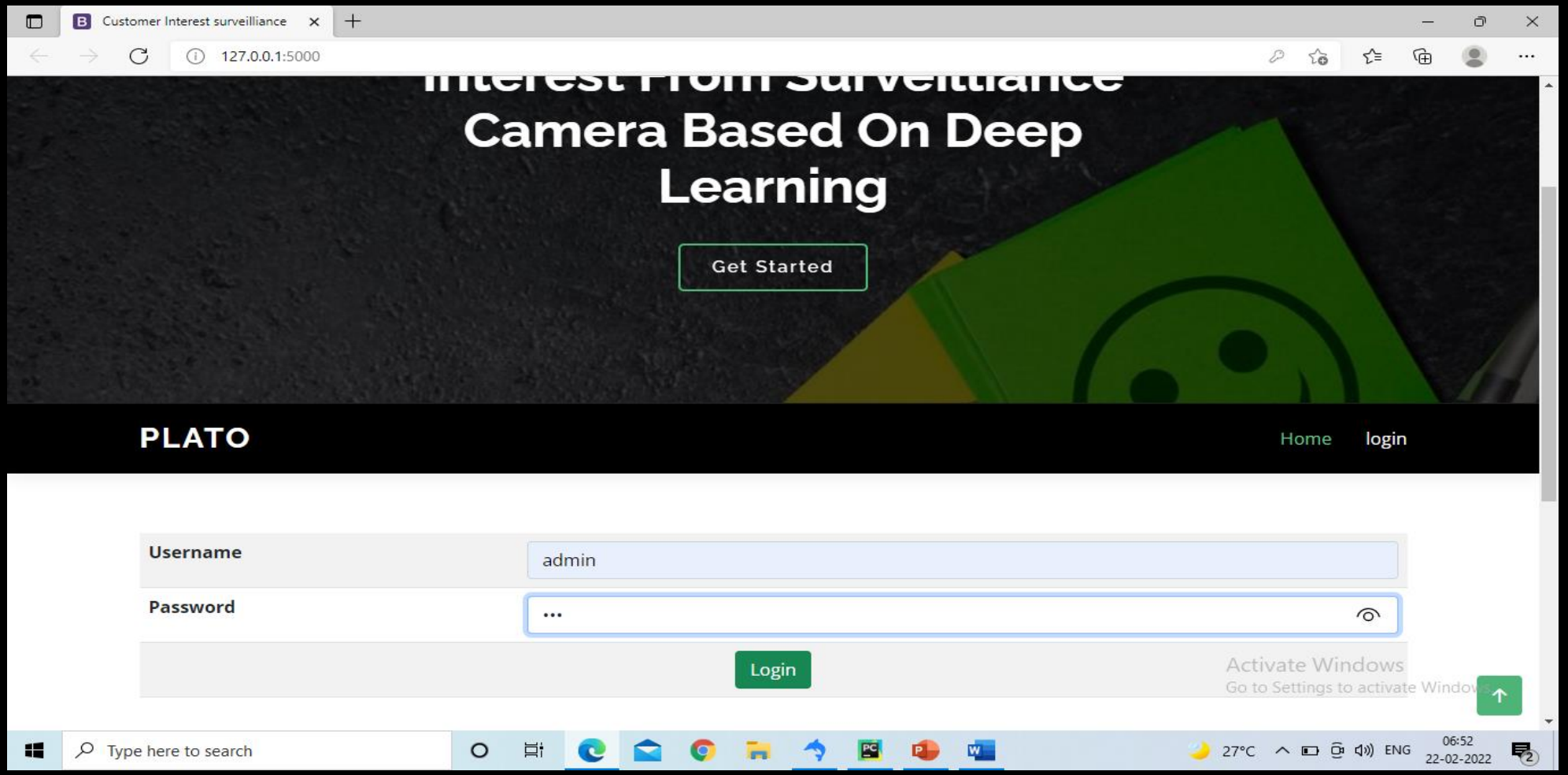
Backlog item	Status and completion date	Original estimate in hours	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Day9	Day10	Day11	Day12	Day13	Day14
User story#1,#2,#3			hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs
Table design	28/12/2021	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Form design	31/12/2021	3	0		1	1	1	0	0	0	0	0	0	0	0	0
Basic coding	08/01/2022	5	0	0	0	0	0	1	1	1	1	1	0	0	0	0
User story #4,#5																
Data set creation	16/01/2022	5	1	1	0	1	1	1	0	0	0	0	0	0	0	0
Detection of face	22/01/2022	5	0	0	0	0	0	0	0	1	1	0	1	1	1	0
User story #6,#7																
Customer's gaze direction method	27/01/2022	5	1	1	1	0	1	1	0	0	0	0	0	0	0	0
Identify customer interest	05/02/2022	5	0	0	0	0	0	0	0	1	1	1	1	1	0	0
User story #8,#9																
Testing data	10/02/2022	5	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Output generation	20/02/2022	5	0	0	0	0	0	0	2	2	2	0	0	0	0	0
Total		40	4	4	3	3	4	3	3	5	4	2	2	2	1	0

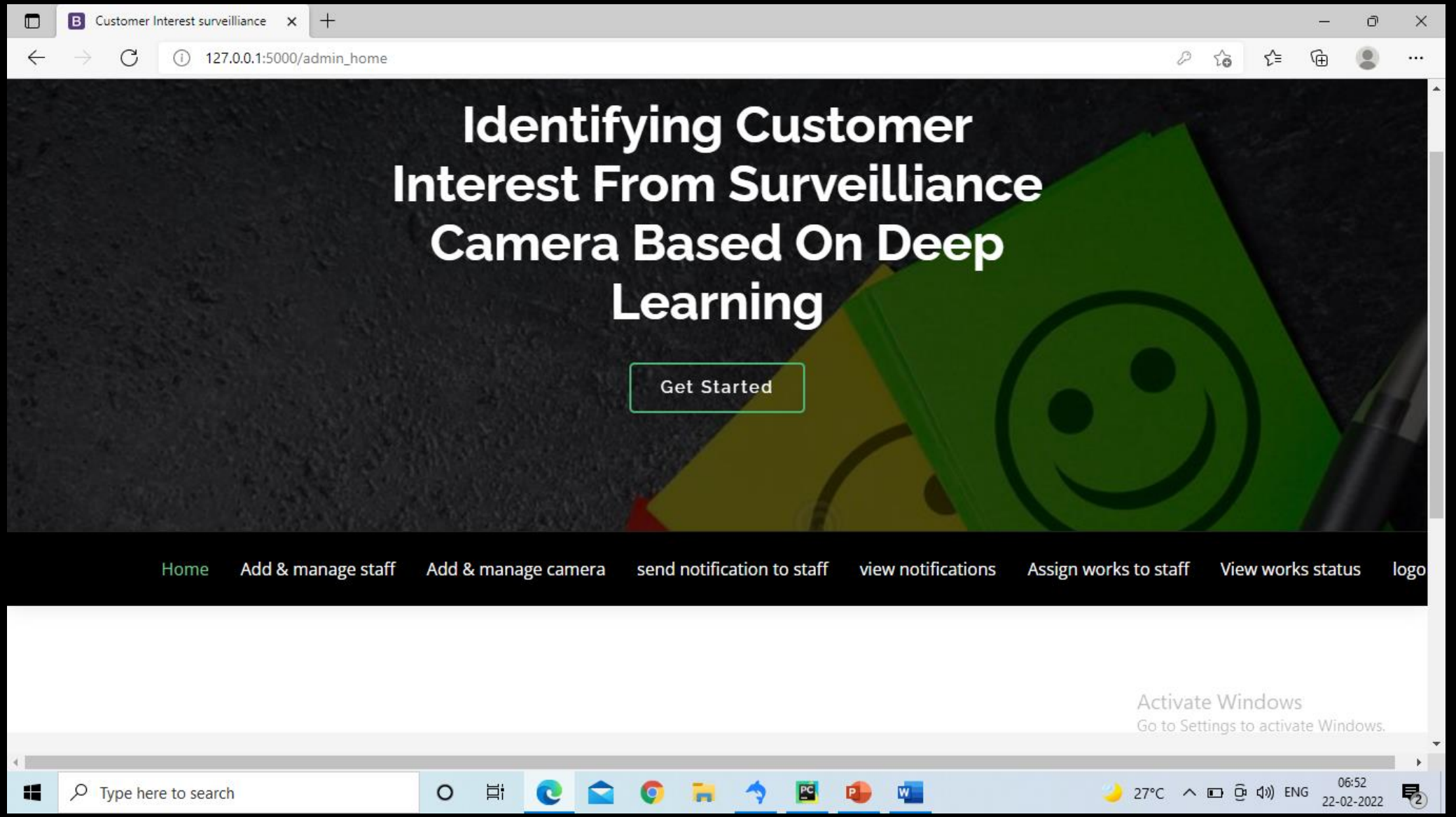
SPRINT ACTUAL

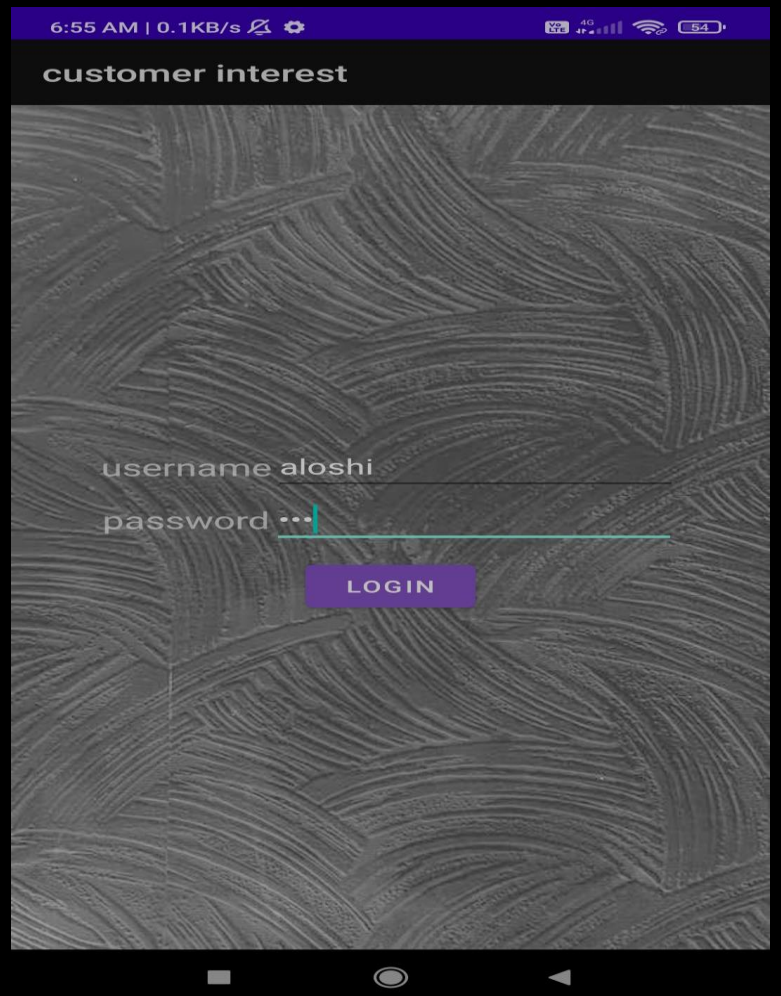
Backlog item	Status and completion date	Original estimate in hours	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Day9	Day10	Day11	Day12	Day13	Day14
User story#1,#2,#3			hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs
Table design	28/12/2021	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Form design	31/12/2021	3	0	0	2	1	0	0	0	0	0	0	0	0	0	0
Basic coding	08/01/2022	5	0	0	0	0	0	1	1	1	2	0	0	0	0	0
User story #4,#5																
Data set creation	22/01/2022	8	2	0	0	2	0	2	0	0	1	0	1	0	0	0
Detection of face	22/1/2022	5	1	0	0	0	2	0	0	1	0	0	1	0	0	0
User story #6,#7																
Customer's gaze direction method	05/02/2022	5	1	0	0	0	2	0	0	0	0	2	0	0	0	0
Identify customer interest	17/02/2022	7	2	0	0	0	0	2	0	0	0	0	2	1	0	0
User story #8,#9																
Testing data	20/02/2022	5	2	0	0	0	0	0	0	2	0	0	0	0	1	0
Output generation	20/02/2022	4	0	0	0	0	0	0	2	2	0	0	0	0	0	0
Total		44	9	1	2	3	4	5	3	6	3	2	4	1	1	0

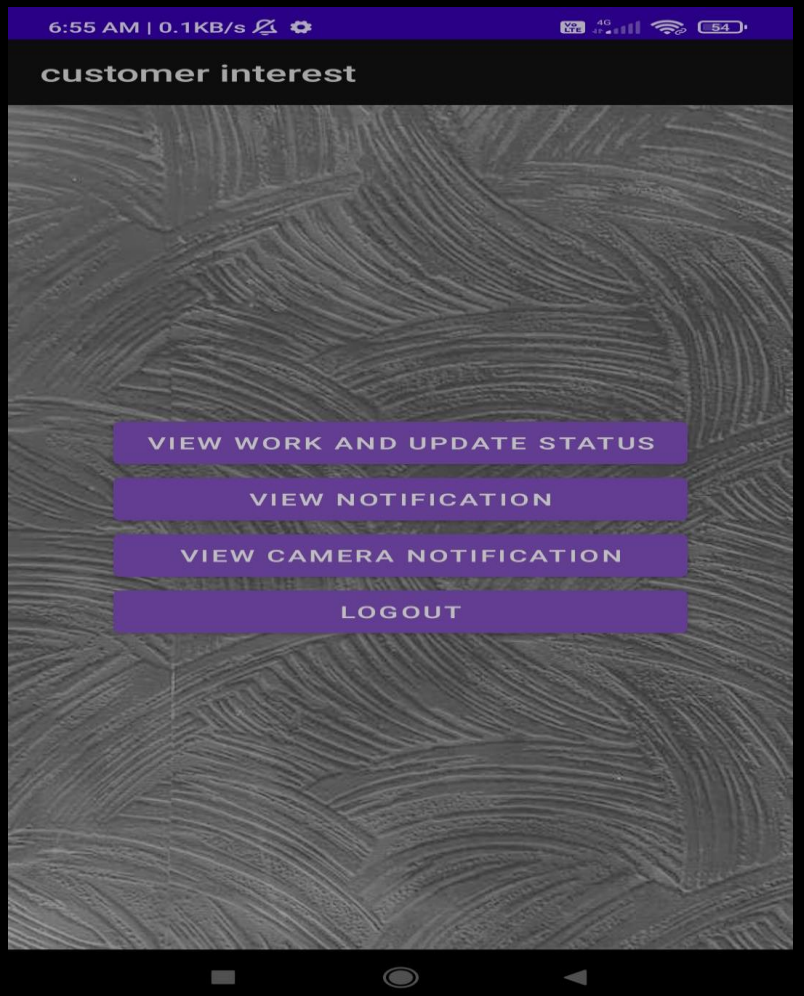
screenshots

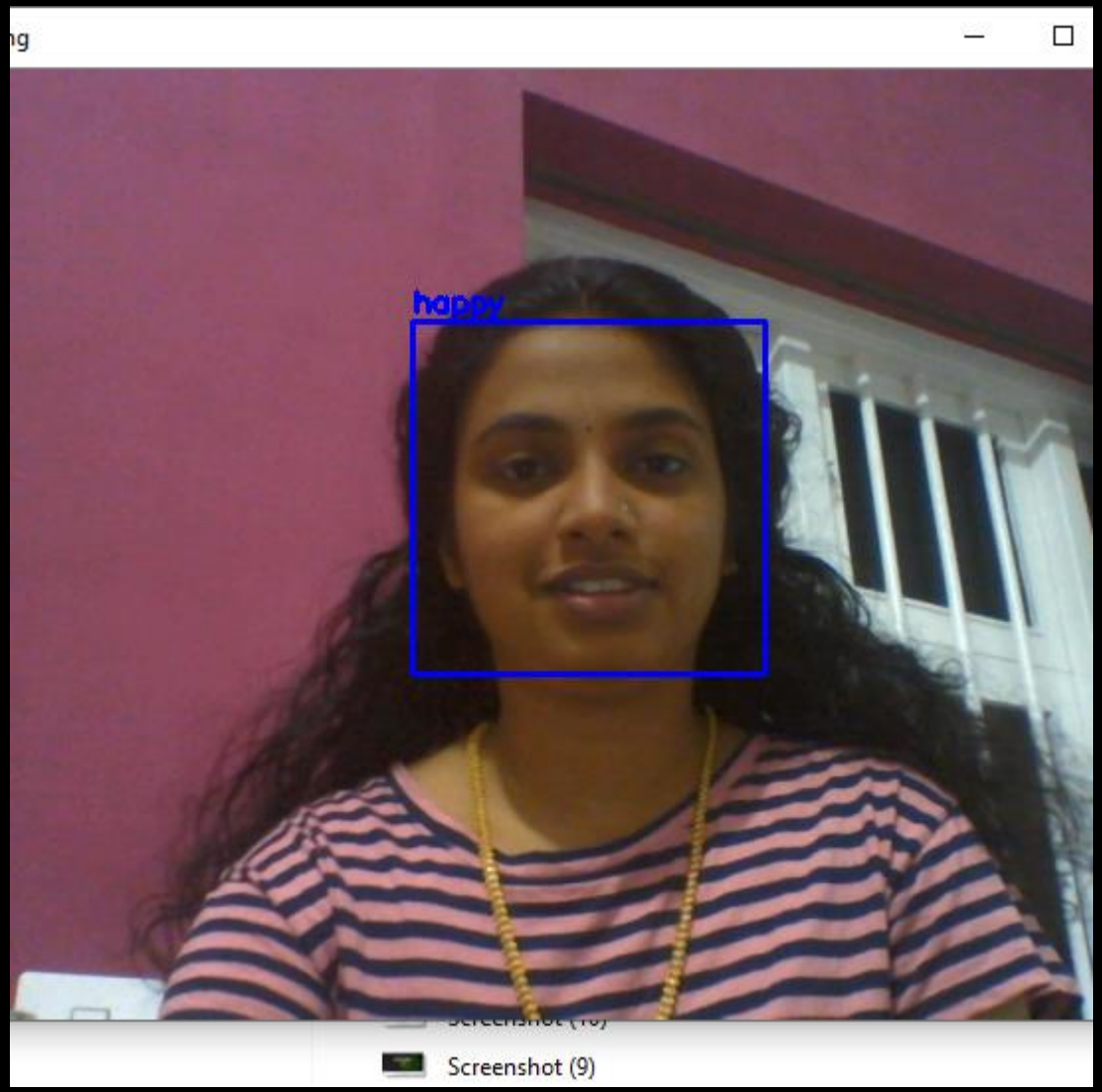



Customer Interest surveilliance
127.0.0.1:5000
Camera Based On Deep Learning
Get Started
PLATO
Home
login
Username
admin
Password
Login
Activate Windows
Go to Settings to activate Windows.
Type here to search
27°C
ENG
06:52
22-02-2022


Customer Interest surveilliance
127.0.0.1:5000/admin_home
Identifying Customer Interest From Surveilliance Camera Based On Deep Learning
Get Started
Home
Add & manage staff
Add & manage camera
send notification to staff
view notifications
Assign works to staff
View works status
logo
Activate Windows
Go to Settings to activate Windows.
Type here to search
27°C
ENG
06:52
22-02-2022


6:55 AM | 0.1KB/s
customer interest
username aloshi
password
LOGIN


6:55 AM | 0.1KB/s
customer interest
VIEW WORK AND UPDATE STATUS
VIEW NOTIFICATION
VIEW CAMERA NOTIFICATION
LOGOUT


ng
happy
Screenshot (9)

THANK YOU